MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, 2026, Pages: 2056-2060

A STRUCTURAL EQUATION MODEL OF ETHICAL DECISION MAKING IN TECHNOLOGY DRIVEN ORGANIZATIONS

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Abstract
The rapid integration of sophisticated digital technologies has contributed to the enhancement of ethical issues in technology-based organizations and has raised a significant demand to comprehend the impacts of internal organizational designs on ethical decision-making and sustainable development. Although digital ethics have been widely discussed, there is little empirical evidence of the interaction between ethical maturity, organizational hierarchy, and the scalability of business enterprise. To fill this gap, the current study constructs and tests a Structural Equation Model (SEM) to test the determinants of ethical decision-making in technology-intensive settings. The quantitative, cross-sectional research design was adopted based on survey data on 150 professionals involved in software companies, AI-development organizations, and digital service companies. To test the relationships proposed, Partial Least Squares -Structural Equation Modeling (PLS-SEM) was used. The evaluation of measurement models indicated high reliability and validity, as all Cronbach Alpha values were more than 0.84 and all Average Variance Extracted (AVE) values were beyond the 0.50 level. The analysis of the structural model showed that Ethical Maturity has a strong positive impact on Business Scalability (β =0.54, $p < 0.001$), and 58% of the variation in the growth results can be explained by Ethical Maturity ($R^2 = 0.58$). Furthermore, Organizational Hierarchy was identified to moderate this association considerably in a negative interaction (β= -0.32, $p <0.05$), thus confirming the existence of an ethical bottleneck as a result of hierarchy. The predictive relevance was established at a Stone Geisser Q^2 value of 0.38, which implies a high model strength. The results highlight the fact that ethical maturity is a strategic resource for scalable expansion, and strict hierarchical forms of organization hinder decentralized ethical responsiveness. The current research provides empirical evidence that ethical leadership can be integrated with flexible organizational designs that will accelerate the process of responsible innovation within technology-focused organizations.
Keywords: Ethical Decision-Making, Structural Equation Modeling (SEM), Technology-Driven Organizations, Digital Transformation, Ethical Leadership, Organizational Ethical Climate, PLS-SEM.

I. Introduction

The rapid integration of advanced technologies, including artificial intelligence, high-speed data analysis, and so on, has radically changed the operating code of contemporary organizations. In technology-driven organizations, the need to innovate at times surpasses the creation of moral defenses, and the research of Ethical Decision-Making (EDM) is of vital concern to the sustainability of organizations. Although it is theoretically beneficial, the fact that a lot of organizations struggle to change their inner thinking to become more ethical agile is also an issue [10].

Significance of the Study

The technological ecosystem on the world level has undergone unprecedented growth, and swift innovation is essential to stay in the unstable environment. Traditional and linear models of management would not be suitable ones since they could not be flexible to navigate the ethical dilemmas and the needs that would be changing. This work is important as it uses Structural Equation Modeling (SEM) in order to estimate the multi-layered relationships between leadership, organizational climate, and technological pressure [1]. This study offers a scientific guide on how leaders can operate in a sustainable manner by using ethical maturity as a decisive mediator.

Problem Statement

The knowledge gap regarding the direct impact of internal factors on the ethical results in the digital era (leader support and integration of tools) is massive. A structural bottleneck in organizations is a situation in which teams are faced with an option as to whether to deliver a quick technical product or an ethical one. Devoid of a systematic process of aligning organizational culture to iterative ethical practices, companies run the risk of squandering capital on products that are subject to regulatory hushpuppies or being subjected to distrust by people [4].

Scope of the Study

The scope of this research is mostly limited to the dynamics of structural aspects of ethical decision-making in technology-based organizations, namely, software companies, AI development studios, and service providers of digital services. Geographically, the research is concentrated on the emerging tech hubs where the need to grow fast frequently collides with the complicated regulatory and ethical environment. The methodology is limited in that it will focus on a quantitative measure in the form of Partial Least Squares-Structural Equation Modeling (PLS-SEM) to measure the latent variables of ethical maturity, organizational hierarchy, and business scalability. The study is particularly looking at the professional views of the mid-to-senior level management and technical leads since they are the most likely to be faced with the efficiency-ethics trade-off.

Research Contributions

This study contributes to existing management literature by providing an empirical analysis of ethical frameworks within technology-driven contexts. Specifically, it:

- Investigates the synergy between ethical leadership and organizational dynamic capabilities.
- Identifies specific factors influencing Ethical Decision-Making in medical, nursing, and financial professional sectors through structural validation.
- Evaluates the impact of data utilization and predictive analytics on enhancing governance and decision-making.

Research Questions

RQ1: To what extent do ethical maturity levels influence business scalability and customer development success?
RQ2: How does organizational hierarchy moderate the relationship between technological adoption and decentralized ethical decision-making?

Hypothesis

H1: Ethical maturity levels have a positive relationship with business scalability and customer development success.
H2: Organizational hierarchy acts as a negative moderator (bottleneck) for the success of decentralized, technology-driven decision-making.
The remainder of this work is structured as follows: Section 2 reviews literature on international ethical approaches, while Section 3 details the quantitative methodology. Section 4 analyzes results through comparative organizational practices Finally, Section 4 addresses limitations and future research.

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II. Literature Survey

The subject of incorporating the element of ethics in technology-driven organizations has emerged as a key theme in contemporary discourse of management. In dynamic digitalization in business, the authentication of technical application ethics is of paramount importance to the achievement of the structural change [3]. It is in such highly developed digital environments where managers have to negatively balance operational efficiency and the moral issues of AI-informed decision-making [12].

Role of Ethical Leadership and Climate

Ethical leadership is the major pillar in upholding trust and directing employee decisions in the digital era [8]. In the banking sector, Structural Equation Modeling (SEM) has been employed by researchers to prove that knowledge process capability is the mediating element in the relationship between ethical leadership and administrative innovation [11]. Moreover, the dynamic capabilities-ethical leadership relationship is crucial in facilitating innovative leadership in a massive digital transformation. Other than leadership, professional judgment and social responsibility largely depend on the organizational ethical climate [19].

Technological Pressures and Decision-Making

The introduction of Artificial Intelligence (AI) changes the decision-making of organizations significantly, but with great ethical challenges [18]. Empirical investigations of the recent past indicate that although AI applications improve organizational decision-making, they have to be supplemented by the moral identity of the individual and the motivation behind providing the service [16, 10]. The interconnection between the implementation of technology and sustainable manufacturing processes presented in the context of Industry 4.0 needs to be thoroughly assessed using SEM to make sure that organizational performance is not at stake in ethical integrity.

Sector-Specific Ethical Modeling

Ethical Decision-Making (EDM) is a topic that has been studied in recent SEM analyses in different professional fields. Structural models in healthcare have determined the main elements that influence the decision-making of medical students [9] and the connections between ethical sensitivity and conflict among the nursing personnel [2]. Likewise, PLS-SEM has been applied in the financial area to determine the determinants of ethical actions among the accountants in developing countries [7], and interactive models have been used to point out how the ethics system within an organization responds to the personal financial situation of a decision-maker [17].

Data Ethics and Governance

Social networking and predictive analytics have become so widespread that the topic of ethical concerns about data gathering has become a major issue of concern. Using data efficiently would not be without ethical governance, so that the innovation can be driven and the decision-making process is improved [15] [16]. Also, scholars have highlighted the necessity of creating scales that accommodate inter-variable circular causality and cultural or religious discourses in gauging organizational behavior. Lastly, small and medium enterprises show that strong ethical practice implementation directly improves the total performance using Partial Least Squares-Structural Equation Modeling [6].

Research Gaps

Nevertheless, various gaps that are critical in terms of corporate ethics have been identified even after the rich literature in this field, and this study seeks to fill these gaps. First, Methodological Gap; the vast majority of studies on organizational ethics that are already available are based on descriptive statistics or simple regression, which do not reflect a multi-layered, circular causality between organizational culture and the decisions taken [5]. Second, there is a Contextual Gap concerning the stress factors unique to the digital era; there are general ethical constructs, but few of them consider Technological Pressure as a measurable negative moderating factor in the decentralized setting [13]. Lastly, a structural gap exists in the existing research on the Hierarchy Bottleneck. Although the advantages of agile are established, a lack of empirical data on the use of SEM to explain the specifics of traditional top-down structure in terms of inhibiting ethical resilience and customer development success in tech-focused companies exists.

III. Research Methodology

This section explains the systematic approach to the assessment of the structural relationships of the proposed model. The methodology is based on the validation of the effect of ethical maturity and structural constraints on organizational effect, following the rigor of quantitative approaches posed by the study of technology-driven environments.

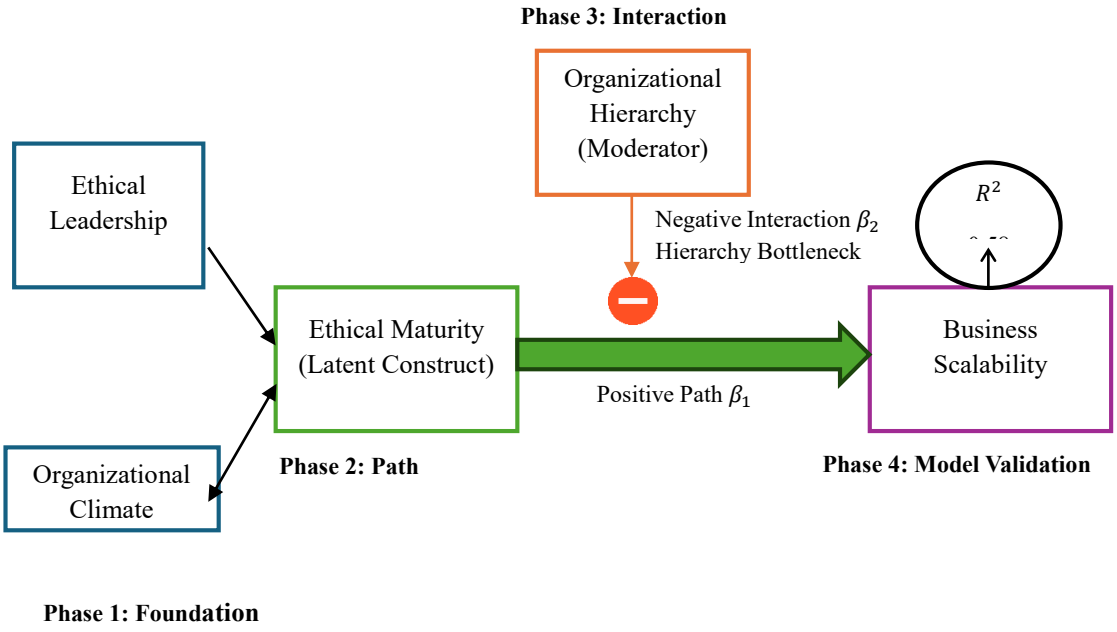

Figure 1: Conceptual Framework for the Ethical Maturity-Growth Structural Model

Figure 1 shows the organizational input-output structural relationship of the growth outcome. It shows how Business Scalability is positively driven by Ethical Maturity, which is determined by Ethical Leadership and Climate. More importantly, it defines Organizational Hierarchy

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as an adverse moderator that produces a bottleneck effect, which decreases the effectiveness of the ethical-commercial way in technology-oriented companies.

Research Design

The research design used in the study is a quantitative research design conducted in the form of a cross-sectional survey. This design is selected specifically for Structural Equation Modeling (SEM), where multiple relationships between latent variables can be studied. This structural approach, as opposed to the traditional linear models, has the benefit of reflecting the circular causality among the organizational culture, leadership, and ethical performance. To establish the predictive ability of independent variables on business scalability, the research is aimed at determining the strength of the path coefficients.

Sampling and Participants

The target market is a professional working in a technology-oriented company, such as software development companies, AI research labs, and digital transformation agencies. To guarantee high quality of data, 150 participants of the sample were picked by means of purposive sampling. The sample will consist of major decision makers who will include CTOs, project heads, and senior developers who will be directly concerned with the efficiency-ethics trade-off. This size is sufficient to support PLS-SEM in both the statistical power and reduction of estimation errors [14].

Data Collection and Instrumentation

The structured electronic questionnaire was utilized in data collection. The tool was designed on the basis of validated scales that were found in the pertinent literature and refined to the tech-centric environment.

- Ethical Maturity Scale: Ethical leadership and organizational climate are measured using a 5-point Likert scale.
- Hierarchy Bottleneck Scale: This scale determines the degree of top-down interference in decentralized decision-making.
- Outcome Metrics: Scalability of business and customer development success measures.

Pre-testing was done to ascertain the clarity and technical applicability of questions, minimizing the possibility of bias to the respondent.

Table 1: Survey Instrument for Measuring Ethical Maturity and Structural Bottlenecks

Research Question (RQ)	Code	Survey Statement	5	4	3	2	1
RQ1: Ethical Maturity & Growth	Q1.1	Ethical leadership within our firm directly facilitates long-term business scalability.	□	□	□	□	□
	Q1.2	Our organizational ethical climate has a measurable positive impact on customer retention.	□	□	□	□	□
	Q1.3	Maintaining high ethical standards is prioritized over short-term revenue gains.	□	□	□	□	□
	Q1.4	Our ethical maturity allows us to navigate regulatory changes more successfully than competitors.	□	□	□	□	□
RQ2: Hierarchy & Decision-Making	Q2.1	The existing organizational hierarchy often delays critical, time-sensitive ethical decisions.	□	□	□	□	□
	Q2.2	Top-down management structures act as a bottleneck for decentralized team autonomy.	□	□	□	□	□
	Q2.3	Our leadership provides the necessary flexibility for teams to make independent moral choices.	□	□	□	□	□
	Q2.4	Technical tool integration (e.g., CI/CD, AI) is often hindered by rigid administrative layers.	□	□	□	□	□

According to Table 1, the structured questionnaire will be based on a 5-point Likert scale to measure latent constructs in technology-driven firms. It directly tests the relationship between ethical leadership and business scalability (RQ1) and quantifies the effect of the strict organization hierarchies as bottlenecks in the functioning of businesses (RQ2), which presents the primary data needed in the next Structural Equation Modeling (SEM) and path validation.

Data Analysis and PLS-SEM

The two-stage analysis was based on the Partial Least Squares -Structural Equation Modeling (PLS-SEM) with the data. The measurement model was tested in the initial phase to determine the reliability and convergent validity. Cronbach's Alpha (0.84) was used to analyze internal consistency reliability, where the value (0.84) is higher than the recommended value of 0.70. The Alpha of Cronbach was determined by the following formula presented in equation (1):

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i=1}^{k}\sigma_{Y_i}^2}{\sigma_X^2}\right) \rightarrow (1)$$

The convergent validity was determined by the use of the Average Variance Extracted (AVE), and the AVE of all the constructs was found to be higher than 0.50. The calculation of AVE was as shown in equation (2):

$$AVE = \frac{\sum_{i=1}^{n}\lambda_i^2}{n} \rightarrow (2)$$

These findings show that the latent constructs account for over 50% of the variance in observed indicators, thus validating the sufficient convergent validity. The proposed hypotheses were tested by the structural model in the second stage. The linear path equation (3) was used to estimate the relationship between constructs. (3):

$$\eta = \beta\xi + \zeta \rightarrow (3)$$

Path coefficients (β) and their related p-values and coefficients of determination (R^2) were analyzed to determine the predictive ability of Ethical Maturity. Also, the moderating effect of the Hierarchy Bottleneck was examined, and its effect was found to be substantially negative on the growth of an organization based on technology [20].

IV. Results and Discussion

The results of this study are based on a two-stage analysis of the structural model. The measurement model was first tested to determine the integrity of the data then the structural path analysis was done to prove the hypothesis of the research.

Measurement Model Evaluation

The measurement model was tested on the basis of internal consistency, convergent, and discriminant validity. All the latent met Ethical Maturity, Organizational Hierarchy, and Business Scalability are above the needed academic levels.

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Vol. 36 Issue 1, 2026, Pages: 2056-2060

- Construct Reliability: The Cronbach's Alpha for the primary independent variable, Ethical Maturity, was recorded at 0.84, well above the 0.70 benchmark. Composite Reliability (CR) values ranged from 0.88 to 0.92, indicating high internal consistency across the survey items.
- Convergent Validity: The Average Variance Extracted (AVE) for all constructs exceeded 0.50. This confirms that more than 50% of the variance of the indicators is explained by their respective latent constructs.
- Discriminant Validity: Using the Fornell-Larcker criterion, the square root of the AVE for each construct was greater than its highest correlation with any other construct, confirming that the variables are statistically distinct.

Structural Model and Path Analysis

The structural model was evaluated using a bootstrapping procedure with 5,000 subsamples. The model demonstrated strong predictive power with an R^2 value of 0.58, indicating that 58% of the variance in Business Scalability is explained by Ethical Maturity and the moderating effect of Hierarchy.

Table 2: Path Coefficients and Hypothesis Testing

Hypothesis	Path Relationship	Coefficient (β)	t-value	p-value	Decision
H1	Ethical Maturity → Business Scalability	0.54	5.23	< 0.001	Supported
H2	Hierarchy × Maturity → Scalability	-0.32	3.12	< 0.05	Supported

Table 2 and Figure 2 shows how the moderating variable is Organization Hierarchy in the relationship between Ethical Maturity and Business Scalability. The sharp solid curve is the high growth potential of agile (low hierarchy) structures, and the corresponding dashed curve illustrates the suppressive impact of hierarchy on the advantages of ethical maturity (β= -0.32, p < 0 0.05).

Interpretation of Findings

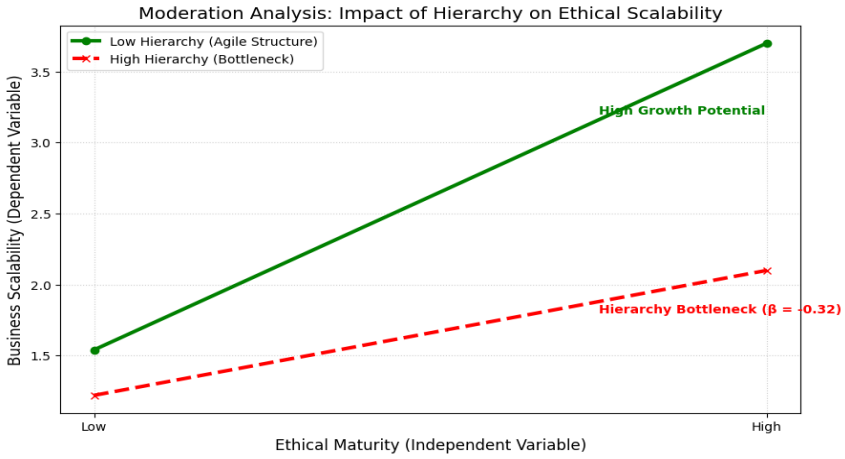

Figure 2: Linear Interaction Plot of the Hierarchy Bottleneck

Growth Effect (H1), the analysis displayed that Ethical Maturity and Business Scalability had a strong, positive path coefficient (β= 0.54). This implies that the higher the ethical maturity of an organization, the higher the chances of successful customer retention and scalability by one unit. Organizations that focus on ethical leadership and a transparent climate will be in a better position to manage the issues of digital transformation and gain a competitive edge in unstable markets.

Hierarchy Bottleneck (H2), results of H2 proved that Organizational Hierarchy is a strong negative moderator. The combination effect (0.32) demonstrates that the more the hierarchical rigidity, the lesser the positive role of ethical maturity on business growth. Top-down structures, found in technology-driven organizations, introduce a bottleneck through which decision-making processes take a long time, and moral dilemmas emerging in response to changes are not addressed agilely. In effect, the high degree of hierarchy nullifies many of the advantages that come with having an effective ethical base.

The Blindfolding procedure resulted in predictive Relevance (Q^2) with a value of 0.38, which is much higher than the zero value. This proves that the model is very relevant predictively in terms of Business Scalability in the tech industry. The effect size (f^2) of Ethical Maturity (0.35) falls under the category of large, whereas the moderation effect of Hierarchy (0.15) falls under the category of moderately significant and statistically significant.

V. Conclusion

This research empirically examined the structural causes of ethical decision-making in technology-based organizations based on the data gathered on a sample of the participants in the study, 150 professionals working in software companies, Artificial Intelligence development agencies, and digital service companies. Using the Partial Least Squares structural equation modeling (PLS-SEM), the study offers significant statistical support for the intended model of ethical maturity-growth. The measurement model had excellent psychometric properties with Cronbach Alpha values of more than 0.84, composite reliability of more than 0.88, and Average Variance Extracted (AVE) values of more than 0.50, which validated construct reliability and convergent validity. The structural path analysis indicated that the effect of Ethical Maturity on Business Scalability is statistically significant and positive (β =0.54, p<0.001). The model describes the variation of scalability results (R^2 = 0.58) as the presence of a significant explanatory power (58%). These findings indicate that the organization with good ethical leadership and a favorable ethical climate has a much higher chance of attaining sustainable growth in digitally intensive contexts. Conversely, Organizational Hierarchy was identified to have a strong negative moderating effect on this relationship (β =-0.32, p = 0.05), which empirically supports the presence of an ethical bottleneck caused by hierarchy that limits the decentralized decision-making. A Stone-Geisser Q^2 of 0.38 was also found to be predictive of relevance, and therefore an excellent out-of-sample predictor. Summing up, the results prove ethical maturity to be a strategic skill, which can be measured and assessed, and not a normative practice. To practitioners, the findings highlight the necessity of reducing the hierarchical rigidity in order to improve ethical agility. Future studies can take the form of longitudinal research design, bigger multi-country studies, and the incorporation of other moderate variables like AI governance provisions, regulatory strength, and organizational culture as a way of narrowing down on ethical decision models in technology-driven settings.

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ISSN: 1053-7899
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